EGG STORE

Embryo development during storage

During egg storage, there is a tendency for embryo viability to decrease. Research over the last 120 years has tried to define the optimal temperature for egg storage, particularly the temperature at which embryo growth and development stops.

The suggested optima from these trials have been surprisingly variable. This is partly because measuring hatchability within a trial needs large numbers of eggs to give a definitive answer, and partly because some different, in retrospect misleading, measures of 'growth' have been used. At the 2022 IFRG meeting, Serdar Özlü presented results of trials where he assessed the embryo stage in eggs stored for three, seven or 14 days at temperatures of 15, 18, 21 or 24°C.

Having spent roughly 24 hours in the oviduct after fertilization, broiler embryos are usually around Stage X when the egg is laid (Eyal-Giladi and Koshkov 1976). At this stage they can safely go into a paused state, with some leeway if cooling is delayed, or there is deliberate reactivation due to a SPIDES treatment. However, if development goes too far, or takes place at relatively low temperatures, embryo survival will be affected, sometimes very badly.

Özlü showed that embryos held at 24°C increased their development stage by 11% in the first three days of storage, and by 44% in eggs held for 14 days. Storage at 21°C showed percentage increases of 6% and 27% to the same ages. When storage temperature was reduced to 18°C, the embryo stage increased by 1% to three days, and 7.35% to 14 days.

This was enough to adversely affect hatchability. Eggs stored at 15°C showed little or no development, fluctuating around the original Stage X by a maximum of 1%. Stored for 14 days, hatchability of eggs stored at 15°C was significantly better than that of those stored at 18°C.

Eggs which have been SPIDES treated will usually show a 2-3 point increase in embryo stage, with much better hatchability than eggs which have been stored in the same conditions without SPIDES treatment. In contrast, when storage temperatures are allowed to fluctuate from 18 to 21°C three times a day, hatchability suffers.

There is a big difference in outcome between in-storage embryo growth at incubation temperature and embryo growth under cool storage conditions. It is important to differentiate between the two, and to keep egg storage temperature at around 15°C, with no fluctuations. This means that farm, transport and hatchery stores need to have sufficient cooling capacity, be well insulated and have doors which are kept closed unless someone is passing through them.

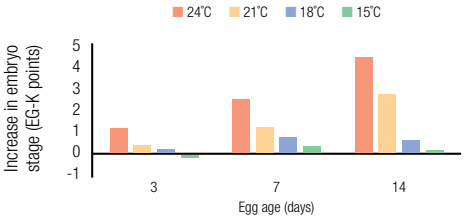

Figure 1 *Changes in embryo stage at different storage temperatures (derived from Özlü et al 2022).*